

Introduction to Civil Engineering Technology

sub-structures

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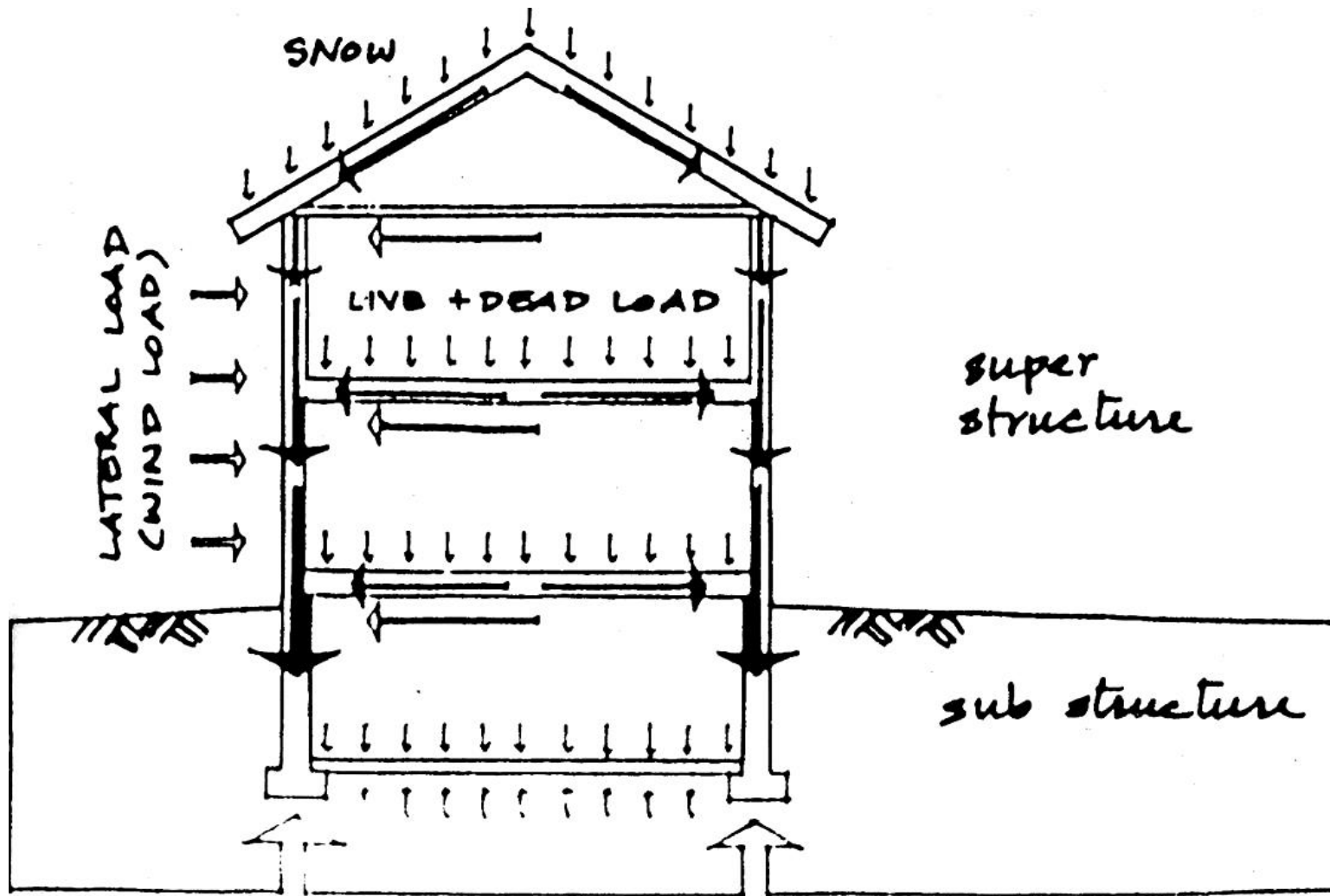




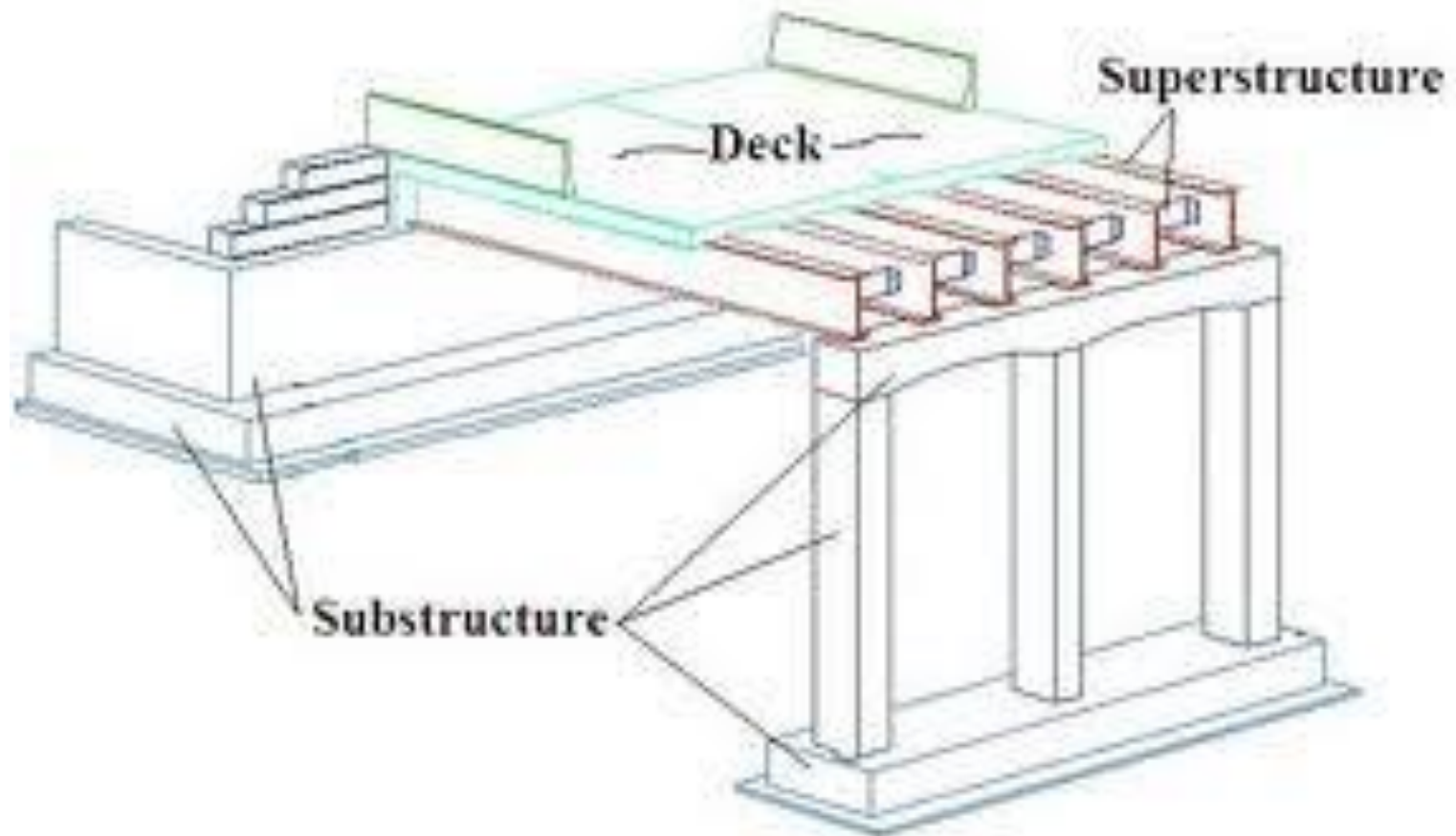
Sub-structure

- The structure that we see above ground surface may be called as superstructure. The **load carried** by the **superstructure** is to be suitably **distributed to the ground** so that it is safely carried. The **structure that is built below ground** level to distribute the load from superstructure on wider area of ground is known as sub-structure. **Foundation is the lowest part of sub-structure** that transfer the load directly to the ground.

Building Sub-structure



Bridge Sub-structure



Sub-structure

- The supporting part of a structure (foundation)
 - column stump
 - footing
 - pile cap
 - Pilie
- Sub-structure will include:
 - Ground beams
 - Ground floor column
 - Ground floor slab

Functions of Foundation

- To distribute the weight of the structure over a large area so as to avoid exceeding load bearing capacity of the soil.
- Incidentally by providing foundation load on soil is evenly distributed and hence unequal settlement of parts of superstructure prevented.
- Foundation takes the structure deep into the ground and anchors it. The overturning and sliding of structures is prevented. Thus foundation gives stability to the structure.
- To secure the level and firm bed for building operations.

Types of Foundation

- Foundations can be considered under two groups
 - Shallow
 - Spread Footing
 - Raft
 - Deep
 - Pile
 - Caisson

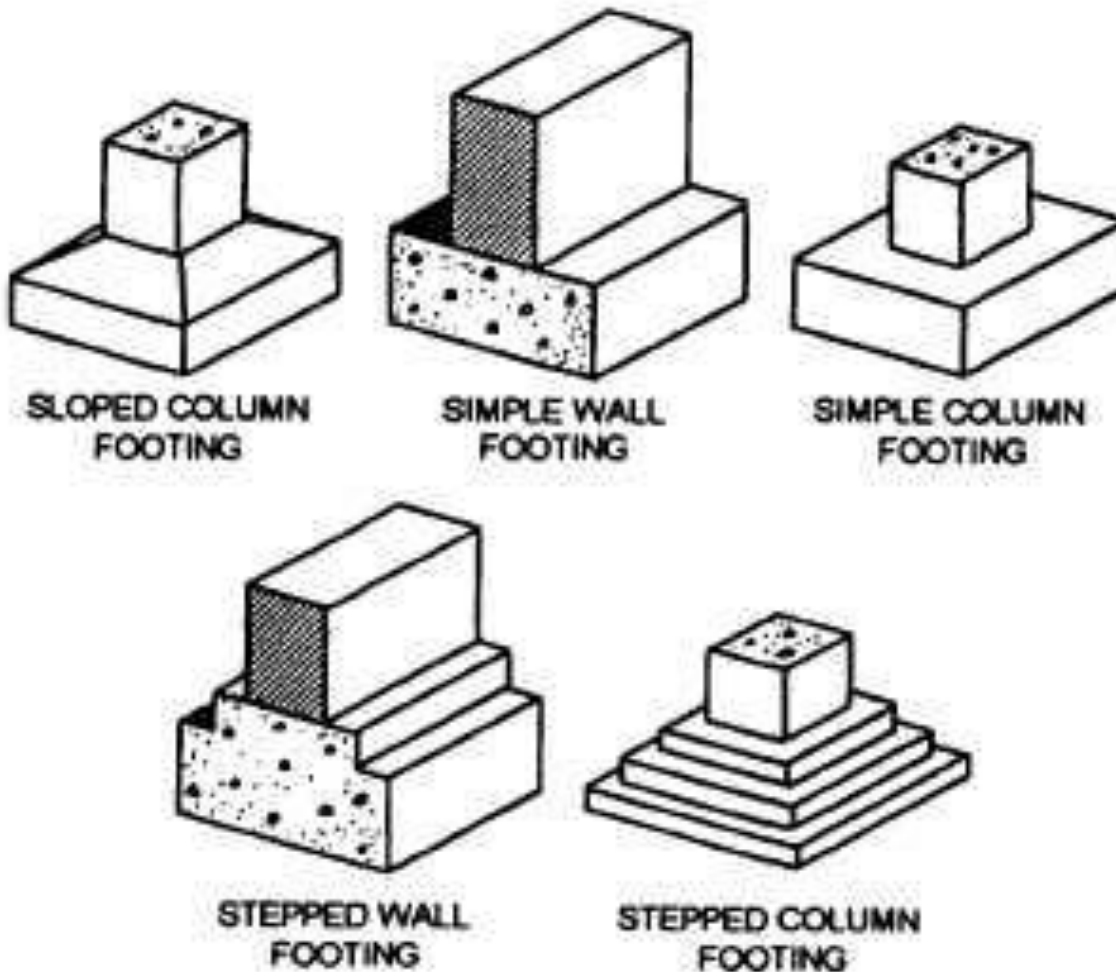
Foundation Selection

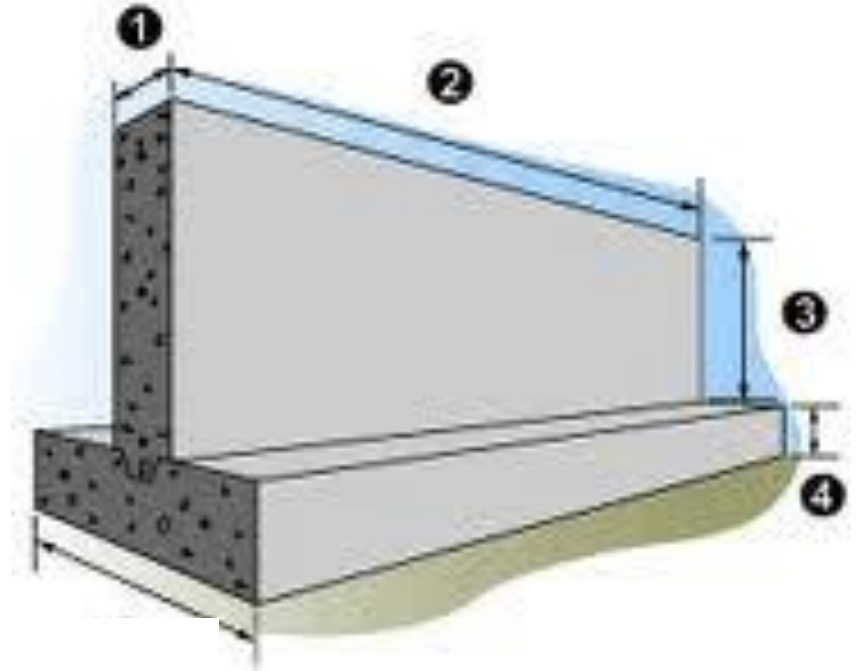
- Soil conditions
- Type of structure
- Structural loading(s)
- Economic factors
- Time factors relative to the proposed contract period
- Construction problems

Footing

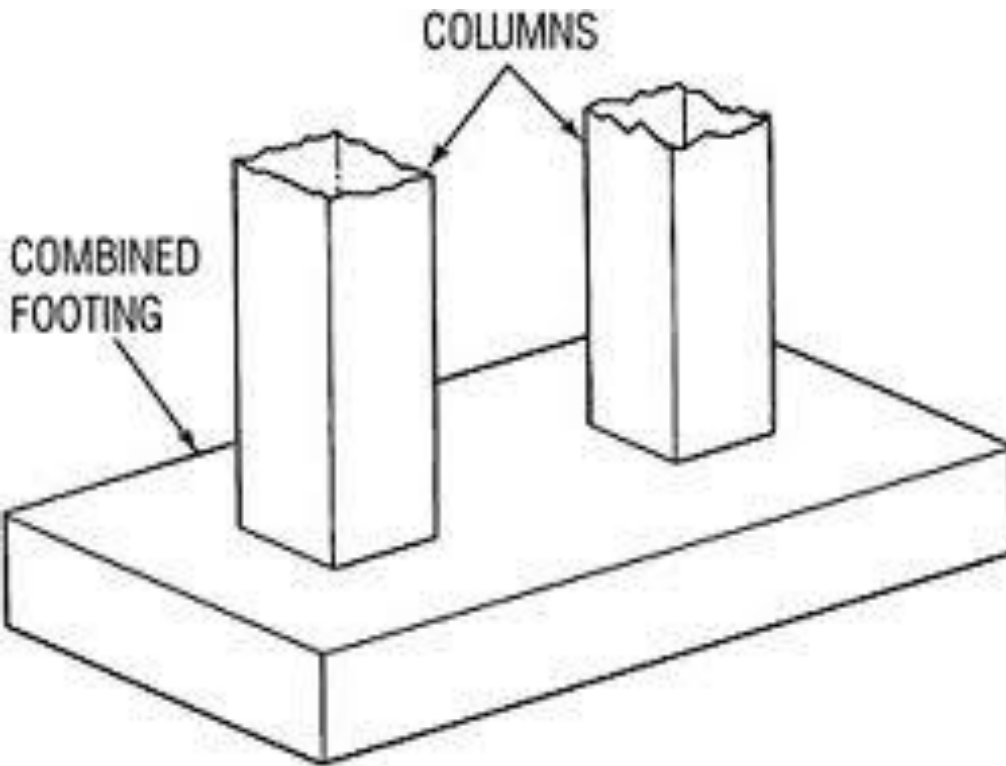
- Isolated Column Footings
- Combined Footing
- Raft Footing

Isolated Column Footings



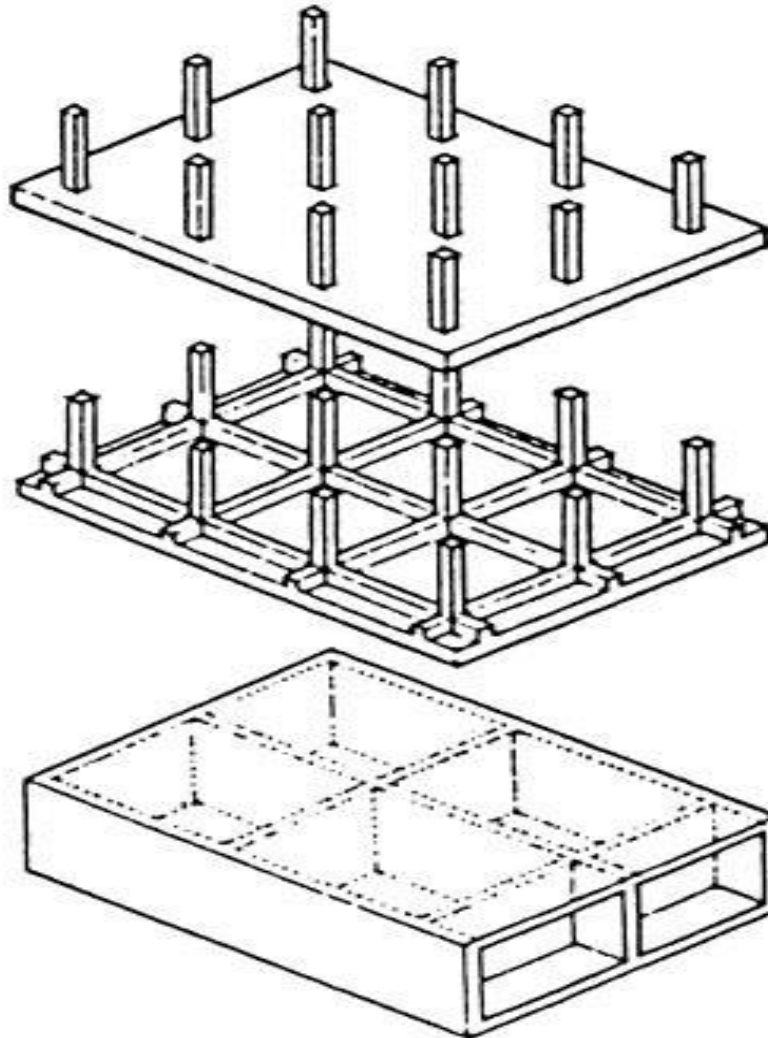


Combined Footings



17/07/2006

Raft Footing



mat

A thick, slablike footing of reinforced concrete supporting a number of columns or an entire building.

ribbed mat

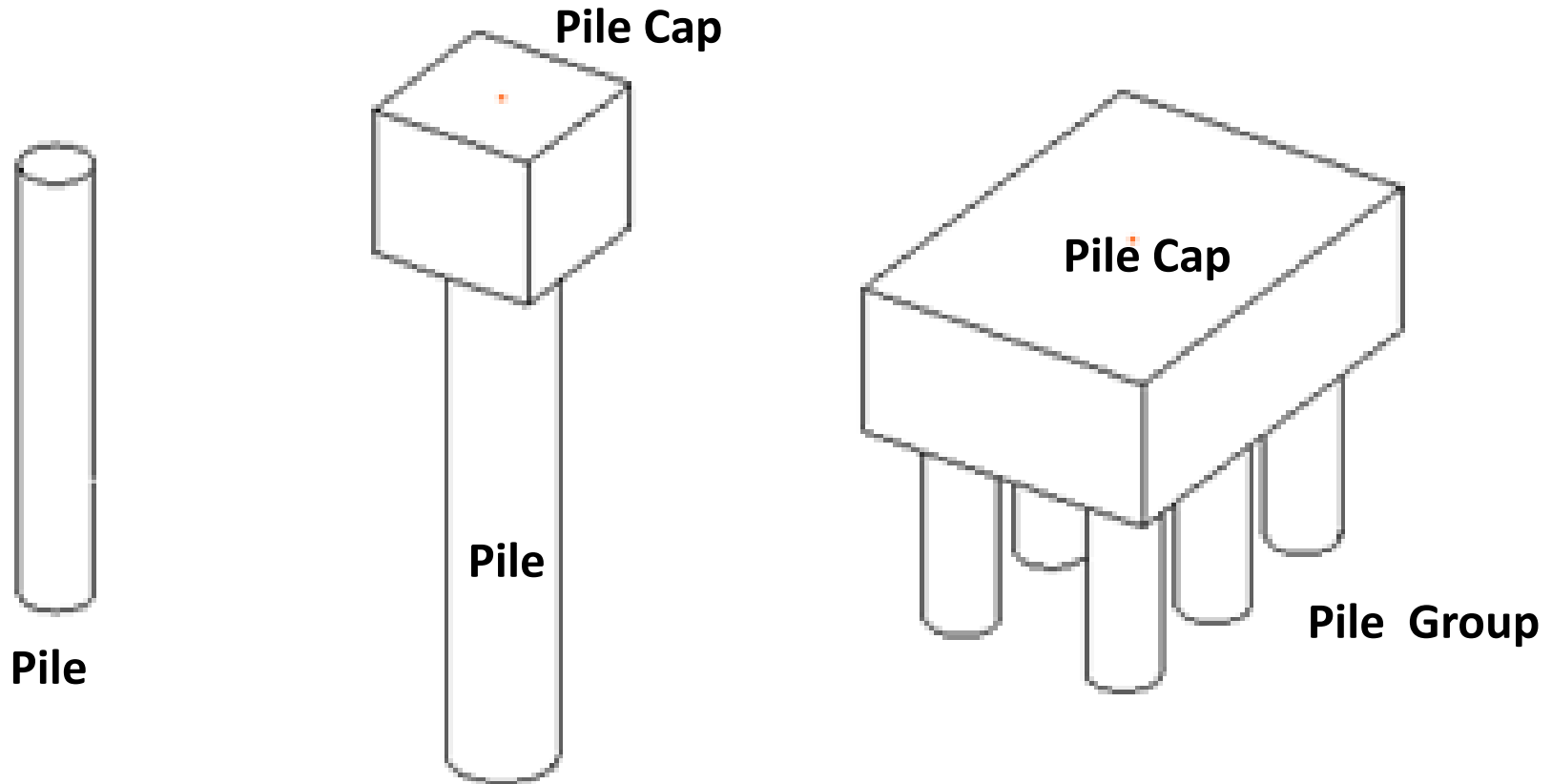
A mat foundation reinforced by a grid of ribs above or below the slab.

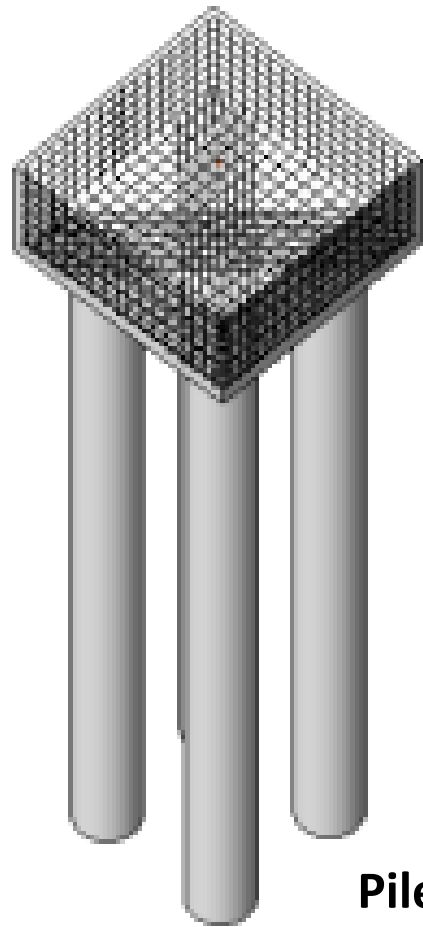
cellular mat

A composite structure of reinforced concrete slabs and basement walls serving as a mat foundation.



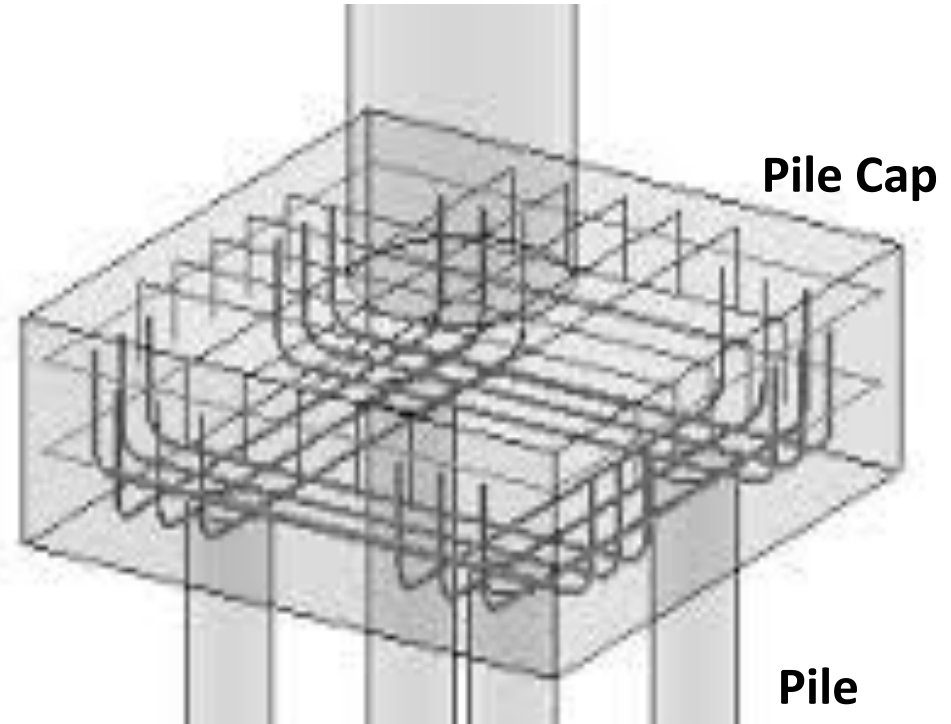
Pile & Pile Cap





Pile Cap

Pile



Column

Pile Cap

Pile

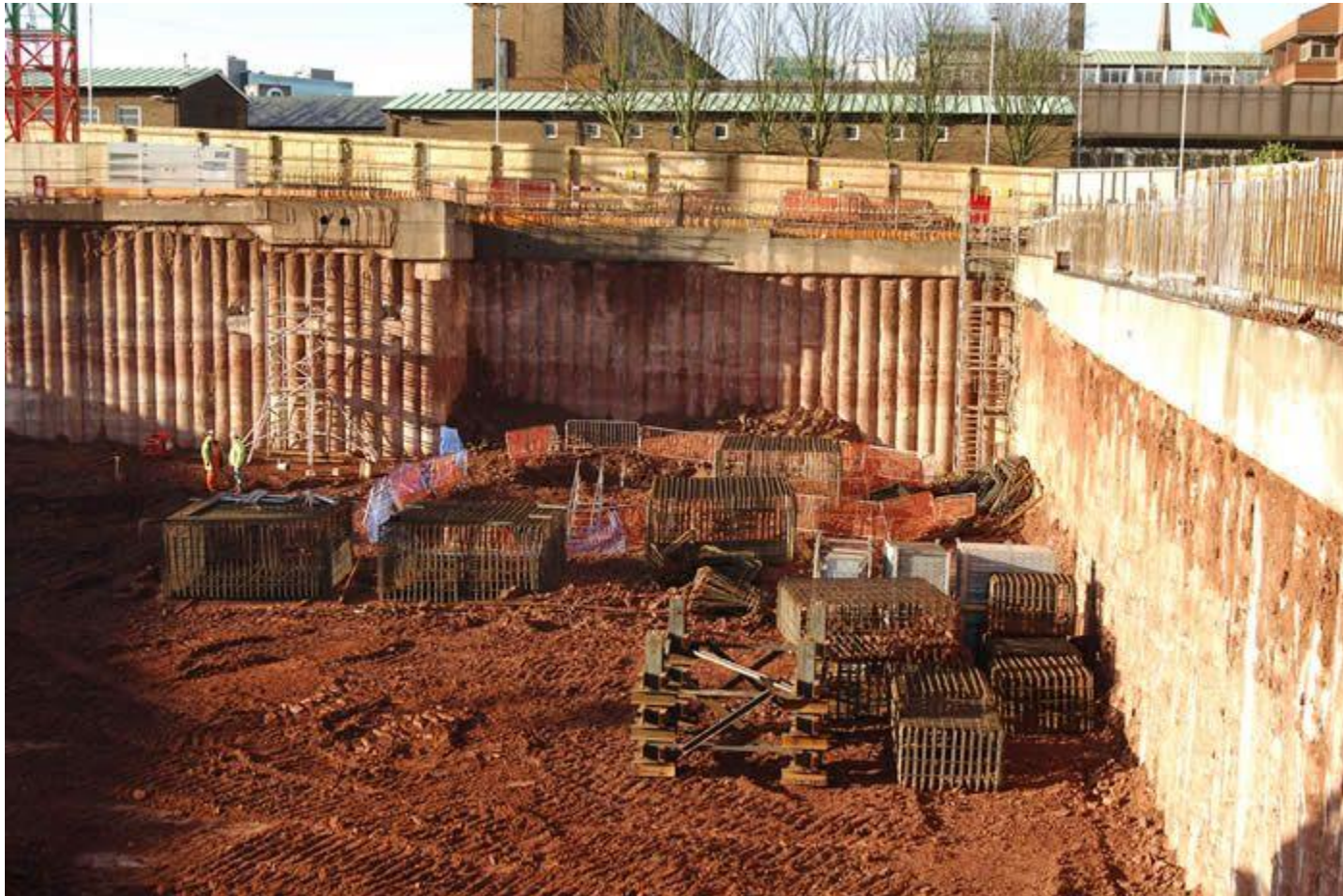
Piling Method





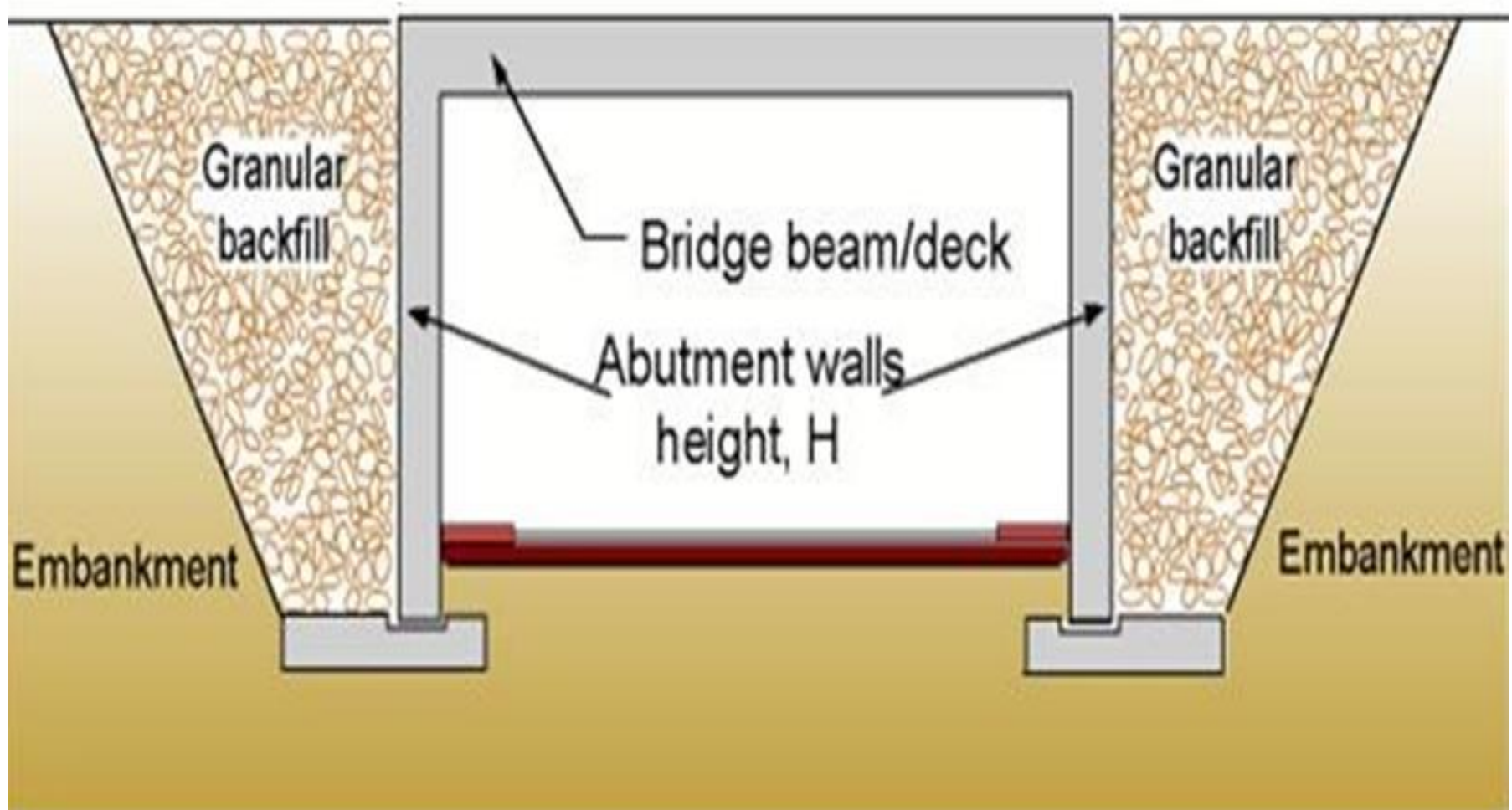








Bridge Foundation



Bridge Foundation

